

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - System Engineering and Radio-Communications		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Signal Processing		
Lecturer (for lectures)		Dončov S. Nebojša		
Lecturer/associate (for exercises)		Stošić P. Biljana		
Lecturer/associate (for OFE)		Stošić P. Biljana		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
Introduction of basic principles and software tools of signal processing in communications. Acquiring theoretical knowledge in the application of analog and digital filters in signal processing.				
Course outcomes				
Acquisition of basic knowledge related to signal processing, such as: frequency spectrum, frequency characteristics, signal filtering, filter function, in order to analyze the system in the time and frequency domain. The application of the theoretical basis for solving practical problems in signal processing in communications. Identifying and using of software tools to handle problems of signal processing.				
Course outline				
Theoretical teaching				
Classifications of discrete signals and systems. Convolution, difference equations, z-transformation and discrete system description. Discrete Fourier transform and its fast algorithms. Filter functions. Amplitude and phase spectra. Filters in signal processing. Ideal filter, prototype and real filter. Aproximations of filter functions. Frequency transformations. Analog network design. Digital filters with infinite (IIR) and finite (FIR) impulse response. Realizations of discrete systems. Design of IIR and FIR filters. Wave digital filters. Transformation of analog prototype filter to wave digital filter. Design of wave digital filters. Software implementation of designed filters. Introduction to applications of signal processing in current technology trends: internet of things (IoT), cloud computing, software-defined radios, robotics, autonomous vehicles, etc.				
Practical teaching (exercises, OFE, study and research)				
Solving of real problems during the exercises. Computer simulations in laboratory by using MATLAB.				
Textbooks/references				
1	Miodrag V. Gmitrović, Microwave and wave digital filters (in Serbian), textbook, University of Niš, Faculty of Electronic Engineering, 2007.			
2	Samuel D. Stearns, Digital Signal Processing with examples in MATLAB, CRC Press, 2003.			
3	B. P. Lathi, Linear Systems and Signals, second edition, Oxford University Press, New York, 2005.			
4	Paolo Prandoni, Martin Vetterli, Signal Processing for Communications, CRC Press, 2008.			
5	Nader Hamdy, Applied Signal Processing, CRC Press 2009.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1	0	0
Teaching methods				
Lectures, exercises, practical work on computers, homework, consultations.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	30
Exercises		15	Oral exam	20
Colloquia		30		
Projects				